



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

4614

NOV 26 2002

REPLY TO THE ATTENTION OF:

FILE: 0446.0615
2002 NOV 27 A 10:33
SRF-5233
FERNALD
LOG D-0254

Mr. Johnny Reising
United States Department of Energy
Feed Materials Production Center
P.O. Box 398705
Cincinnati, Ohio 45239-8705

RE: Northern Pines Plantation
Restoration Design Plan

Dear Mr. Reising:

The United States Environmental Protection Agency (U.S. EPA) has completed its review of the United States Department of Energy's (U.S. DOE) Northern Pines Plantation natural resource restoration design plan. The plan details the conversion of the planted pine plantation in the northern portion of the site to the early stage of a deciduous forest with interspersed areas of wetlands and grasslands.

U.S. EPA has enclosed comments on the document. Please contact me at (312) 886-0992 if you have any questions regarding this matter.

Sincerely,

James A. Saric
Remedial Project Manager
Federal Facilities Section
SFD Remedial Response Branch #2

Enclosure

cc: Tom Schneider, OEPA-SWDO
Sally Robison, U.S. DOE-HQ
Jamie Jameson, Fluor Fernald
Terry Hagen, Fluor Fernald
Tim Poff, Fluor Fernald

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TECHNICAL REVIEW COMMENTS ON
"NORTHERN PINES PLANTATION NATURAL
RESOURCE RESTORATION DESIGN PLAN"

FERNALD ENVIRONMENTAL MANAGEMENT PROJECT

GENERAL COMMENTS

Commenting Organization: U.S. EPA Commentor: Saric
Section #: Not applicable (NA) Page #: NA Line #: NA
Original General Comment #: 1

Comment: The document does not provide sufficient soil data to evaluate the suitability of the natural communities and plant species proposed for the site. The soils in the Northern Pines Plantation (NPP) should be described in terms of their physical properties (for example, texture, depth, permeability and drainage, and classification), limitations (such as winthrow hazards, rocky substrates, or fragipans), and spatial distribution. Much or all of this information should be readily available from the county soil survey.

In addition, the document does not discuss the relationship between hydrology, soil types, and proposed restoration activities. Although the document notes that tile drainage systems exist at several locations in the NPP and that "a number of wet areas exist on the property" (Section 1.1.1), it is not clear whether these areas once supported wetlands or whether the proposed wetlands and vernal pools will be artificial habitats created in an upland environment. The document should identify the extent and location of any hydric soils on the property as well as the types and permeabilities of subsurface soil materials in the areas proposed for wetlands and vernal pools.

The soil information is also needed to evaluate the potential effects of any changes in local hydrology on existing plant communities in the NPP. For example, Section 2.1 notes that (prior to harvesting) many of the pine trees in the plantation were dead or highly stressed because of disease and poor growth rates. However, Section 2.2 indicates that much of the NPP is poorly drained, a factor that also could have adversely affected the health of the pine plantation and contributed to the observed heavy mortality (that is, the pines were planted off site). Additional changes in hydrology resulting from capping the tile drainage network or altering surface drainage patterns could cause further deterioration of the remnant pine stands in the NPP.

Comment: The document should provide additional information regarding future management of white-tailed deer at the NPP and proposals for "herbivore control" (Page 1-4, Line 7). The document does not contain information on the current estimated herd size in the NPP, describe diurnal and seasonal migration patterns of ungulates in the area, or discuss known problems with deer browsing of forest vegetation in the area. Additional information should also be provided to support the concept of creating "deer travel corridors" as a means to reduce herbivory in the restoration area. Creation of additional edge habitat in the NPP is likely to attract additional deer to the area, and it is not clear how deer would be contained in such travel corridors to prevent excessive browsing on the planted trees, shrubs, and herbaceous vegetation. If deer browsing is anticipated to be a severe problem at the NPP, it may be appropriate to use exclusion fencing in small areas in order to allow establishment of the new plantings and to expand use of tree shelters and other individual plant protectors. The document should also discuss whether future deer harvests or other reproductive control measures are appropriate to maintain the health of restored natural communities at the NPP.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: NA Page #: NA Line #: NA
Original General Comment #: 3

Comment: In general, the goals for restoration of natural plant communities at the NPP would be better served by minimizing edge effects in forest and grassland habitats at the plantation. Although the report specifies that "more pronounced edge habitat" is a goal of the restoration design (Section 2.2), habitat fragmentation is a well-known problem affecting the health of native forest, grassland, and wetland communities in the Midwest. Fragmented habitats typically favor generalist species such as the white-tailed deer, raccoon, and blue jay over species that require larger blocks of contiguous habitat for breeding and survival. Habitat fragmentation tends to reduce overall habitat quality for many species by increasing nest parasitism and the predation rates for edge-sensitive species such as neotropical migratory songbirds. In addition, fragmented forest and grassland patches are more susceptible to invasions by non-native shrubs such as the amur honeysuckle (*Lonicera maackii*) and multiflora rose (*Rosa multiflora*),

which generally require a lightly shaded environment normally found in edge habitats. Higher numbers of frugivorous birds and mammals that disperse the seeds of non-native plants may also be attracted by edge habitats.

To the extent possible, the spatial designs of habitat restoration projects at the NPP should be developed in the context of anticipated restoration activities associated with the Northern Woodlot Enhancement and Wetland Mitigation Phase II Projects. In addition to providing more interior habitat for edge-sensitive species, this approach would facilitate more effective resource management of the larger Northern Woodlot Restoration Project in the future (for example, prescribed burns could be conducted for larger prairie plantings rather than many smaller burn units). Developing the restoration design within a larger spatial context may also result in less pronounced transitions between community types, thus minimizing edge effects.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: NA Page #: NA Line #: NA
Original General Comment #: 4

Comment: The document refers several times to the presence of field tiles that drain the site and to a plan to remove or plug these drain tiles. However, Figures 1-1 through 1-4 do not show the locations of the known drain tiles and do not identify the areas that the tiles are believed to be draining. Also, the document provides no discussion of the effects of drain tile removal, especially as they relate to the planting plan. The document should (1) identify the locations of known drain tiles and the areas believed to be drained by these tiles, (2) discuss the effects of drain tile removal on the planting plan, and (3) provide a specification for removal or plugging of drain tiles.

[illegible]

Comment: The document describes a plan for creation of vernal pools with side slopes of 3H:1V (see Section 3.2, Page 3-1, Lines 24 and 25). These slopes are very steep, even steeper than the typical side slopes of residential area detention ponds. Therefore, the proposed design of vernal pools with such steep side slopes is questionable. Wetland designs typically include very shallow slopes for wet areas to promote diversity of plant life. Steep slopes do not provide a sufficiently gentle hydrologic gradient for establishment of a wide variety of plant life. The document

should propose development of vernal pools with shallower slopes or should provide justification for development of pools with steep slopes. In addition, it appears that the vernal pools will be constructed in natural drainage swales. One option would be to create the pools by constructing a series of checks across the swales similar to the checks that beavers create when they build their dams. The earth needed could be obtained by creating an excavation area just upstream of the checks.

Commenting Organization: U.S. EPA
Section #: NA Page #: NA
Original General Comment #: 6

Commentor: Saric
Line #: NA

Comment: Although the document discusses mulching and follow-up monitoring of seedlings and saplings, it does not indicate whether any measures are necessary to control competing vegetation (particularly grasses) in order to ensure adequate establishment of the planting stock. Follow-on herbicide applications are discussed for control of invasive shrubs; however, the document does not discuss site preparation activities (mechanical preparation or use of herbicide) for areas to be seeded or planted with bare-root seedlings. The document should provide a more complete discussion of follow-on activities, including any measures necessary to control competing vegetation and the site preparation activities for areas to be seeded or planted with bare-root seedlings.

Commenting Organization: U.S. EPA
Section #: NA Page #: NA
Original General Comment #: 7

Commentor: Saric
Line #: NA

Comment: The document frequently refers to various activities such as plantings or vernal pond development that were scheduled for (and possibly completed in) summer and fall 2002. Given that the document is dated October 2002, it is not clear whether these activities have already been completed or will be completed in accordance with the proposed schedule. The dates identified for restoration activities should be checked and revised as necessary.

Commenting Organization: U.S. EPA
Section #: NA Page #: NA
Original General Comment #: 8

Commentor: Saric
Line #: NA

Comment: The document contains various tables presented in particular sections and appendixes. Some of these tables include blank cells. The meaning of these blank cells is not clear. For example, Table 2-3 and tables in Appendix C contain a column titled "Placement." Cells in this column

either contain the term "edge" or "wet" or are blank. It is not clear where species for which no placement is specified will be planted. Therefore, all blank cells in table columns titled "Placement" should be explained. This could be done using a series of footnotes.

Similarly, in the same tables, columns titled with a series of dates (such as "2002 Fall") contain blank cells. It is assumed that a blank cell in such a column means that a particular species will not be planted during the time period indicated. However, for clarity, blank cells in such columns should be explained. Again, this could be accomplished using footnotes.

SPECIFIC COMMENTS

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 1.1.2 Page #: 1-2 Lines #: 21 to 30
Original Specific Comment #: 1

Comment: The text should be revised to clarify whether the "rows" of specific pine species are or were composed of several rows (that is, a strip) or randomly planted "clumps." The text should also be revised to specify whether the remaining patches of unharvested pines have been thinned to improve their growth rates and, if so, what stand density was achieved.

Commenting Organization: U.S. EPA Commentor: Saric
Sections #: 1.1.2/1.2 Page #: 1-3 Lines #: 4 to 6, and 19 to20
Original Specific Comment #: 2

Comment: The text should be revised to clarify where the deciduous trees and shrubs will be planted. Section 1.1.2 states that all pine areas cleared during the early 2002 harvest will be (or have been) planted with native grasses. However, Section 1.2 states that "native deciduous trees and shrubs will be planted among remnant patches of pines." It is not clear whether this means that the deciduous trees and shrubs are to be planted in the understory of the pine stands or in the areas that were clear-cut. If the latter is the case, the text should be revised to discuss the potential effects of competition with native grasses on the growth and survival of the trees and shrubs.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 1.2 Page #: 1-3 Line #: 23
Original Specific Comment #: 3

Comment: Wild grape (*Vitis spp.*), although it is an invader of disturbed areas, is generally not considered to be an invasive species in the same context as amur honeysuckle, multiflora rose, or garlic mustard. It may be desirable to control grapevines as part of the establishment of a new forest stand or if grapevines have caused excessive damage to mature trees at a given location. However, its complete "extirpation" (Page 5-2, Lines 23 and 24) from the NPP is not necessary and would in fact eliminate a valuable source of soft mast for many wildlife species.

Commenting Organization: U.S. EPA Commentor: Saric
Figures #: 1-3 and 1-4 Page #: NA Line #: NA
Original Specific Comment #: 4

Comment: Figures 1-3 and 1-4 present the restoration design plan for ponds 1 and 2 and for ponds 3 through 7, respectively. Both figures contain too much detailed information to be clearly presented on an 11- by 8.5-inch page. For example, it is difficult to determine where the two main community types (oak-hickory and beech-maple forests) are currently located and where additional trees are to be planted. Figures 1-3 and 1-4 should be reprinted on C- or D-size sheets.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 2.0 Page #: 2-1 Lines #: 3 to 8
Original Specific Comment #: 5

Comment: The text refers to a "reduction of mono-culture acreage." For clarity, the text should be revised to specify that the "mono-culture acreage" referred to is pine. The phrase could be rewritten as "mono-culture (pine) acreage." Also, the text does not identify the acreages of the pine patches remaining after the reduction of pine acreage, the acreages of the hardwood patches to be planted, or the prairie planting acreages. This acreage information should be presented to allow evaluation of the proposed habitats for wildlife and other conservation goals.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 2.1 Page #: 2-1 Lines #: 11 to 14
Original Specific Comment #: 6

Comment: The text states that the Natural Resource Trustees (NRT) agreed to (1) a cutting design for the NPP and (2) the presence of "several islands of pines that were not cleared." However, the text does not cite any references

for the agreements. Section 2.1 should be revised to cite references for these agreements.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 2.1 Page #: 2-1 Lines #: 24 to 34
Original Specific Comment #: 7

Comment: The text discusses Figure 2-1 with regard to the presence of pines "in four distinct groupings" at the NPP. However, Figure 2-1 does not clearly identify the four distinct groupings of pines referred to in the text. Figure 2-1 should be revised to clearly identify these pine groupings. In addition, for added clarity, Figure 2-1 should be revised to add a north arrow and the dates (month and year) associated with the "before" and "after" portions of the figure.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 2.2 Page #: 2-2 Lines #: 10 and 11
Original Specific Comment #: 8

Comment: The text states that "the topography for the site is gently sloping." However, as shown in Figure 1-2 (which is referenced in the text) and as discussed elsewhere in the text, the northern part of the NPP is very steep. The text in Section 2.2 should be revised accordingly.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 2.2 Page #: 2-2 Lines #: 16 to 21
Original Specific Comment #: 9

Comment: The text discusses various drainage paths and swales in the NPP and refers to Figure 1-2. However, Figure 1-2 does not clearly present the drainage paths and swales referred to in the text. Figure 1-2 or the text should be revised to resolve this apparent inconsistency. Preferably, Figure 1-2 should be revised to clearly identify the drainage paths and swales.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 2.3 Pages #: 2-2 and 2-3 Lines #: 28 to 34 and 1 to 7
Original Specific Comment #: 10

Comment: The document states that trees and shrubs will be planted in "more densely grouped" patches to minimize deer browsing. The document also indicates that the density of the plantings will not deviate from that used in past projects (650 plants per acre or roughly an 8- by 8-foot spacing between plants). The text should be revised to discuss the proposed spatial arrangement and density of plants in these clusters of patches in terms of how they

will affect stand growth and the time required to achieve full canopy closure.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 2.3 Page #: 2-5 Lines #: 2 to 5
Original Specific Comment #: 11

Comment: The text should be revised to clarify whether the intent of the restoration design is to establish oak-sugar maple forest types or oak-hickory forest types. Based on the numbers of *Acer saccharum* seedlings or trees identified in Appendix C for planting in each "patch," it appears that sugar maple will be a dominant or co-dominant species in the stands.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 2.3.1 Page #: 2-7 Line #: 4
Original Specific Comment #: 12

Comment: Table 2-1 presents the "upland mesic prairie seed mix" proposed for use as part of the restoration. The table has a column titled "CW," which refers to the "coefficient of wetness." However, Table 2-1 does not define this term or explain how the species-specific CW values relate to specific planting locations. Table 2-1 and the text of Section 2.3.1 should be revised to present this information.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 2.3.1 Pages #: 2-7 and 2-8 Line #: NA
Original Specific Comment #: 13

Comment: Based on the stated CWs, a number of species appear to be placed in inappropriate planting mixes. For example, *Aster novae-anliae*, *sliphium perfoliatum* and *Verbena hastata* in Table 2-1 are typically wet mesic prairie species, and *Monardia fistulosa*, *Ratibida pinnata*, and *Rudeckia hirta* in Table 2-2 are upland mesic to dry mesic prairie species. Tables 2-1 and 2-2 as well as the document in general should be reviewed and revised as necessary to assign species to appropriate planting mixes.

Commenting Organization: U.S. EPA Commentor: Saric
Sections #: 2.3.3.1 and 2.3.3.2 Page #: 2-9 to 2-12 Line #: NA
Original Specific Comment #: 14

Comment: The total numbers of individuals identified for the plantings do not match the values given in the Appendix C tables. For example, in Table 2-3, 250 sugar maple individuals are proposed for planting over a 3-year period (2002 through 2004). However, in Appendix C, 960 sugar maple seedlings are proposed for planting over the same 3-year period. To eliminate confusion, the planting numbers

should be deleted from Tables 2-3 and 2-4, and the correct numbers should be presented in Appendix C. The tables in Appendix C should also be clearly labeled to indicate whether the numbers presented pertain to containerized/ball and burlap plants or bare-root seedlings.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 3.2 Page #: 3-1 Line #: 21 to 28
Original Specific Comment #: 15

Comment: Section 3.2 discusses two vernal pools that "will be constructed along the remaining stand of pine trees in the northern portion of the NPP." Section 4.2 (Page 4-1, Lines 26 to 33) refers to two vernal pools that were "constructed during late Summer 2002." It is not clear whether the two sets of vernal pools are the same or different. Sections 3.2 and 4.2 should be revised to clarify this matter.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.1 Page #: 4-1 Lines #: 7 to 23
Original Specific Comment #: 16

Comment: Section 4.1 discusses the proposed planting and patch design. The locations and arrangements of the different planting patches and planting plots are difficult to visualize. The discussion refers to "patch pages" presented in Appendix C, but this reference does not clearly indicate that Appendix C contains a figure showing the proposed planting patch and plot locations. Section 4.1 should be revised to specifically cite the figure presented at the end of Appendix C that shows the proposed planting patch and plot locations.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.2 Page #: 4-1 Lines #: 29 to 33
Original Specific Comment #: 17

Comment: The text should be revised to clarify whether the plugs will be planted on the margins of the vernal pools or throughout the basins of the pools. If the pools hold water to their anticipated depth (3 feet), plug planting throughout their basins could result in excessive mortality of species more suited to wetland margins.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.3.1 Page #: 4-2 Lines #: 10 to 13
Original Specific Comment #: 18

Comment: Fall planting of bare-root seedlings in water-logged soils or soils prone to frost heave is generally not recommended. These soils should be planted during spring or

periods of drier conditions. Section 4.3.1 should be revised accordingly.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.3.3 Pages #: 4-2 and 4-3 Lines #: 34 and 1 to 3
Original Specific Comment #: 19

Comment: Section 4.3.3 discusses the potential availability of specific plants and the procedures that will be followed to find an appropriate replacement if a specific plant is not available. Specifically, the text states that "each tree and shrub species has been assigned a substitution category that any substitution must meet in order to fulfill the same habitat role as the original species." However, specific substitution categories are not identified in the text. The document should be revised to identify the specific substitution category that each plant has been assigned. Also, each of the substitution categories should be summarized and referenced.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 4.3.4 Page #: 4-3 Lines #: 6 to 9
Original Specific Comment #: 20

Comment: The text indicates that specific planting locations for species will be determined by the restoration ecologist and then adjusted according to site-specific hydrologic and topographic conditions. However, Section 4.1 specifies that trees and shrubs will be located in planting plots "without the identification of a specific planting location for individual plants." Section 4.3.4 also indicates that seedlings will be randomly placed in the plots under the supervision of the restoration ecologist. The text should be revised to clarify whether the planting locations will be randomly or systematically chosen. The text should also discuss how the approach to be used will affect the planting densities discussed in other sections.

Commenting Organization: U.S. EPA
Section #: 5.1 Page #: 5-1
Original Specific Comment #: 21

Comment: Given the stated planting densities, the anticipated seedling mortality rate of 50 percent would appear to conflict with the goal of developing a forest canopy within a 5-year period (Page 5-2, Lines 29 to 34). A planting density of 160 saplings per acre will result in a closed forest canopy much more slowly, particularly if plantings are clumped as proposed in the document. If the anticipated mortality rate for seedlings cannot be reduced through site preparation, planting techniques, or protection from

herbivory (deer and rabbit browsing), an increase in the planting density for bare-root tree seedlings should be considered. Interplantings of nuts could also be used to increase the density of seedlings and decrease the overall effects of browsing and seedling mortality.

Commenting Organization: U.S. EPA

Commentor: Saric

Section #: 5.1.1.2

Page #: 5-2

Lines #: 10 to 11

Original Specific Comment #: 22

Comment: The text states that at least 50 percent of the area will have native grass cover at the end of the first growing season. This is an aggressive goal and may not be appropriate for the long-term mix of native grasses. Typically, a heavy mixture of annual native grass would be planted at the expense of perennial native grasses. The restoration ecologist should identify a mixture of annual and perennial native grasses that is appropriate for the local ecosystem, and the text should be revised to reflect the expected coverage of native grasses after the first growing season.

Similarly, the text calling for "90 percent coverage of grasses at the end of the first growing season" appears to be unrealistic. Such a goal could be achieved only by overseeding, and overseeding generally results in less than optimal growing space for newly germinated seedlings and slower establishment of native perennials. The text should be revised to explain how the goal will be met without introducing these potential problems.

Commenting Organization: U.S. EPA

Commentor: Saric

Section #: 5.1.2

Pages #: 5-2 and 5-3

Original Specific Comment #: 23

Lines #: 29 to 34 and 1 to 3

Comment: Although periodic monitoring of individual plants for survival and growth may be used to assess the short-term success of a restoration planting, stand establishment is better evaluated on the community level. This is particularly true for trees such as oaks, which may show low growth rates for individual plants during the first 5 to 10 years of stand establishment. The percentage of forest canopy cover and the time required to develop a closed overstory canopy are better indicators of community productivity and forest health for a newly established stand. It may also be useful to monitor the numbers and percentage cover of invading (that is, not planted) tree and shrub species at a location to determine whether the desired community composition is being maintained over time.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 5.1.2.2 Page #: 5-2 Line #: 20
Original Specific Comment #: 24
Comment: Section 5.1.2.2 should be renumbered as
Section 5.1.1.3.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: 5.1.2.2 Page #: 5-3 Line #: 5
Original Specific Comment #: 25
Comment: Section 5.1.2.2 should be renumbered as
Section 5.1.2.1.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: References Page #: R-1 Line #: 11
Original Specific Comment #: 26
Comment: The reference cited as "Brewer 2002" lacks various
particulars. Specifically, this reference should be revised
to identify Mr. Brewer's title and organization and to
provide the date (month and day) when the statements
attributed to Mr. Brewer were made.

Commenting Organization: U.S. EPA Commentor: Saric
Section #: References Page #: R-1 Line #: 11
Original Specific Comment #: 27
Comment: The references beginning with "U.S. DOE 1998a" and
continuing through the end of the reference section do not
specify a month or date for the reports listed. To the
extent possible, each of these references should be revised
to specify the date (month and day) when each report was
issued.

Commenting Organization: U.S. EPA Commentor: Saric
Appendix #: A-3.2.A Page #: 5 of 9 Line #: NA
Original Specific Comment #: 28
Comment: The specification states that stabilization of
disturbed areas... shall be performed... within 7 calendar days
of knowing a disturbed area will be idle for more than
45 calendar days. This specification does not provide
protection for lands that will be disturbed for less than
45 days. The appendix should be revised to set
specifications for protection of idle land that will be left
in a disturbed condition for more than 7 days.

Commenting Organization: U.S. EPA Commentor: Saric
Appendix #: A-3.2.E Page #: 5 of 9 Line #: NA
Original Specific Comment #: 29

Comment: The specification states that soil preparation shall be performed by tilling or cultivating soil to a depth of 2 inches. In areas where heavy equipment has been used, 2 inches of tilling will not eliminate the compaction. The appendix should be revised to specify a greater depth of tilling or ripping for areas with heavy compaction; for example, a depth of 9 inches might be suitable.

Commenting Organization: U.S. EPA Commentor: Saric
Appendix #: B-3.3.A Page #: 3 of 4 Line #: NA
Original Specific Comment #: 30

Comment: The specification states that bare-root plants that require overnight storage shall have their root balls covered completely with hardwood mulch. The phrase "and be kept moist with periodic watering" (the phrase used in Section 3.1.E) should be added to the specification. Alternatively, because mulch will still allow desiccation of the roots, particularly if the storage location is exposed to wind or sun, Appendix B could be revised to specify that bare-root plants that require overnight storage shall be "heeled-in," particularly if the plants are to be stored for several days.